Demonstrating the Correctness of a Simple Deducing Method of the Formula E=mC²

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Abstract

Because the mathematical derivation of special relativity that Einstein introduced is very complicated, people have put forward several new methods in physics. This paper verifies the correctness of the mathematical method presented in the book. The Visible Theory Of Relativity, by the Japanese physicist, Kurt Fischer.

Keywords

Uniformly accelerated rectilinear motion, non-uniformly rectilinearly accelerating, energy, mass, classical mechanics.

1. Introduction

It is very good for most people who cannot understand theory of relativity to choose the book, The Visible Theory Of Relativity. Theory of relativity is described by Kurt Fischer using simple language and formulas in this book. However, there are certain vulnerabilities, in fact, in the seemingly perfect method. Aiming at these errors, this paper verifies the correctness of the mathematical method of the formula $\boldsymbol{E = mC^2}$.

2. Formula Derivation Under Discussing Only the Entire Uniform Motion

Kurt Fischer has some descriptions in the book. If there is a wall on the absolute smooth horizontal plane and many light sources are placed on one side of the wall, all light sources give off a lot of light suddenly in the moment, which will produce thrust on the wall. Its structure is shown in figure 1and the formula of energy is:

$$\boldsymbol{E = P \cdot \Delta V} \tag{1}$$

And $\boldsymbol{\Delta V = V - V_0}$ is the changing volume of the areas of light; $\boldsymbol{V_0}$ is initial volume of the areas of light; pressure $\boldsymbol{P = F/S}$, $\boldsymbol{F}$ is thrust and $\boldsymbol{S}$ is area.

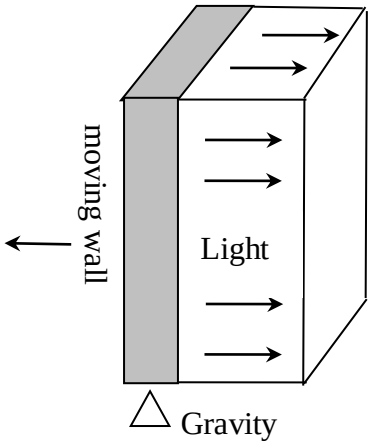

Figure 1. The sketch of the light uniform motion

Because of $\boldsymbol{V_0 = 0}$,

$$E = P \cdot V \tag{2}$$

If $S = 1m^2$, we can gain

$$E = F \cdot l \tag{3}$$

Some information can be seen in the above formulas. Because of producing the light energy, the wall must get the thrust F, and the wall starts moving under the condition of smooth surface. The light sources will not get out light after the time t, and there is a system that is composed of the wall moving to the left and the light moving to the light. Because internal work does not affect the external system, the entire system's gravity will not change, as shown in figure 2.

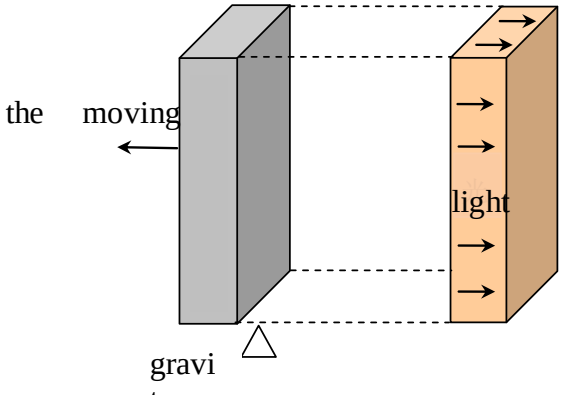

Figure 2. the mobile image of light regiment

When the wall quality left, it is wanted that the center of gravity is constant only let light group take away part of the energy.

When only considering that the wall after the process does the uniform motion, momentum formula is shown as

$$p = mv \tag{4}$$

m is mass and v is the speed of movements.

Newton's Second Law is shown as

$$F = ma \tag{5}$$

Where a is acceleration.

Let's multiply both sides by the time t,

$$Ft = mat \tag{6}$$

Because

$$v = at \tag{7}$$

Therefore

$$Ft = mat = mv \tag{8}$$

Due to the law of the conservation of energy, let's gain

$$F \times t = m \times v \tag{9}$$

Bringing the formula (3) into the last formula, as shown in the formula (10) ,

$$\frac{E}{l} \times t = m \times v \tag{10}$$

Because $c = l/t$,then let's gain

$$\frac{E}{c} = m \times v \tag{11}$$

Transformation formula was obtained

$$\frac{E}{c^2} \times c = m \times v \tag{12}$$

Let's multiply both sides by the time t_0,

$$\frac{E}{c^2} \times ct_0 = m \times vt_0 \tag{13}$$

Because the distance that the wall dose move $s_1 = vt_0$ and the displacement distance of light $s_2 = ct_0$,some formulas will be gained .

$$\frac{E}{c^2} \times s_2 = m \times s_1 \tag{14}$$

$$\frac{E}{c^2} = m_0 \quad \text{or} \, E = m_0 c^2 \tag{15}$$

Here, m_0 is static mass of light.

From the angle of uniform motion, the formula is really perfect, but there are some loopholes in terms variable speed.

3. The Diffiences of the Uniformly Accelerated Motion(Particle)

If the derivation process of the formulas is always set up, the formula (14) and (15) was established constantly.

There are two cases in the early stage of the wall's acceleration process. Because the description of s_2 in this book is very fuzzy, let's consider s_2 as the movement distance of shiny side or the movement distance of light regiment.

If s_2 is the movement distance of light regiment, the movement distance of light regiment relative to the wall is 0 because the wall and light regiment are not separated. In other words, $s_2 = 0$ and

$$\frac{E}{C^2} \times 0 = m \times s_1 = 0 \tag{16}$$

Because $m \neq 0$, the wall must move under the action of force. Therefore $s_1 \neq 0$,which is in conflict with the above formula, and the first kind of circumstance does not accord with theory.

If s_2 is the movement distance of shiny side, the movement distance of the wall is

$$s_1 = \frac{1}{2} at^2 \Rightarrow at = \frac{2s_1}{t} \tag{17}$$

because $v = at$,the formula (12)is

$$\frac{E}{C^2} \times C = m \times at \Rightarrow m\frac{2s_1}{t} = \frac{E}{C^2} \times C \tag{18}$$

The time of the light pressure is equal to the time of wall movement, $t = t_0$,when let's multiply both sides by the time t ,the formula is shown as

$$m2s_1 = \frac{E}{C^2} \times s_2 \Rightarrow m2s_1 = m_0 \times s_2 \tag{19}$$

There is contradictory situation after having some comparison with the formula(14), and only $m = 0$ make the formula hold. Due to the wall's true mass, there must be the formula $m \neq 0$. The second kind of circumstance does not accord with theory.

In a word, the derivation of uniformly accelerated motion is not accord with this book.

4. Conclusion

This paper discusses the above four kinds of cases separately, there is some conclusions that the derivation in this book is correct when the wall does uniform motion. In a word, the correctness of the seemingly simple method is also less accurate. Therefore, it is also proved that science is rigorous, Science is rigorous, and will be not a spot with deviation.

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